

**RESEARCH ARTICLE :**

# Performance of migratory apiary units in Sri Muktsar Sahib district of Punjab

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**SUMMARY :** The study was conducted during the year 2013-14 and 2014-15 in Sri Muktsar Sahib district of Punjab state. Objective of the study was to study the economic performance of migratory apiary units. Total 45 respondents were selected for the purpose of the study. The analysis of the personal characteristics of the respondents revealed that migratory apiary units were adopted by unemployed rural youth from all the sections of the rural society. Bee keepers from the district migrate to adjoining Haryana and Rajasthan states during the dearth of flora in district Sri Muktsar Sahib of Punjab. The study revealed that mainly three routes were followed by beekeepers of Sri Muktsar Sahib district Punjab. The average number of honey harvests varied from 8.5-11.0 year<sup>-1</sup> with average honey production of 29-45kg hive<sup>-1</sup>. It was maximum in case of bee keepers migrating to Kota district of Rajasthan (Group II) in winter period. The average number of honey harvests was 9 year<sup>-1</sup> with average honey production of 35 kg hive<sup>-1</sup> in case of bee keepers migrating to Ganga Nagar district of Rajasthan (Group I) in winter period. Total income per hive was maximum in Group II (Rs. 3812.8) followed by Group I (2946.2) and Group III (2406.8).

**KEY WORDS :**

Apiary, Beekeeper, Migratory, Sri Muktsar Sahib

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## **BACKGROUND AND OBJECTIVES**

India is agriculture based economy with majority of population living in rural areas and has farming as major occupation. Farmers are facing many challenges in the current scenario. Land holding are getting fragmented and emerging small holding are becoming unviable. Further, increasing input cost and low yields are resulting in poor income to the farmers. Other aspect which demands immediate attention is the unemployment among rural youth. Low formal educational qualifications and lack of employment

opportunities in industry or service sectors is resulting in large scale unemployment in rural areas. Therefore, need is to promote small scale enterprises among farmers for enhancing their incomes and generating employment among rural youth. Most of the enterprises viz., dairy, poultry, mushroom farming and apiculture if adopted on scientific lines can not only provide additional incomes to the farming families but can generate substantial employment opportunities. Beekeeping is becoming a very fascinating occupation day by day. It can be practiced by

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all sections of the society it may be by men, women, grown up children and even by physically handicapped and old persons (Monga and Manocha, 2011). Due to low expenditure requirement and high income, beekeeping enterprise can be adopted by small, marginal and landless farmers (Sharma and Dhaliwal, 2014). Beekeeping does not bring any pressure on agriculture land and it produces honey, beeswax, pollen, propolis from the flowers which otherwise dry up in nature and go waste. Success of beekeeping depends upon some basic factors such as suitable climatic conditions, bee forage, bee management and bee breeding. The combinations of these factors lead to better honey and bee wax production (Free, 1981). Net returns from beekeeping increasing as number of colonies increases (Kumar, 2012 and Sharma and Dhaliwal, 2014), but beside better strains of bees and their appropriate management, production of honey also depends upon the bee floral resources available within the flight range of bees. Various climatic and ecological factors also affect the production and availability of nectar to the honeybees. Thus, abundance and richness of nectar and pollen resources around an apiary is quite important for the success of beekeeping in an area. If the favourable conditions prevail the level of beekeeping can be increased to semi-commercial or commercial level. Bee keeping on commercial scale is possible only if flora is available in abundance. Agricultural crops are seasonal and provide bee forage for limited periods. Bee colonies cannot be sustained throughout the year in any cultivated area. During the forage scarcity periods between two crop seasons, bee colonies are moved to areas where bee flora is available in abundance (Kumar and Singh, 2002). Thus, management of *A. mellifera* bee colonies involves their migration to locations with rich forage potential (Singh *et al.*, 1998). Though beekeepers are undertaking migration for production, there is a great scope to increase the efficiency and improve honey production by opting migration cycle which has the potential to provide rich honey harvests (Gatoria *et al.*, 2001). For assessing the economics of different bee migration cycles of the available floral resources involves formulation of floral calendars for each area giving the forage crops, flowering period and forage availability. This will help in formulating migration schedules, bee colony multiplication and other seasonal operations of bee colonies. This can be facilitated with knowledge of floral resources and evolving appropriate migration schedules for different beekeeping regions. In this context

economic performance of different migration cycles followed by bee-keepers of district was assessed during the present study with the aim to guide the new beekeepers regarding migration of honey bees.

## RESOURCES AND METHODS

The study was conducted in Sri Muktsar Sahib district of the Punjab state during the year 2014-15. An inventory of bee keepers trained by KVK Sri Muktsar Sahib was prepared and a purposive sampling was done from bee keepers following different migration cycles. A total 45 respondents were selected for the study purpose. An interview schedule was developed for collection of data regarding socio-economic status of bee keepers in four blocks in terms of age, land holding, occupation, caste, marital status. The data were collected from the respondents were tabulated and analysed by using percentage and frequency and economic analysis was done for comparison. The cost and benefit ratios were also computed and the total cost divided by gross income was used to compute the B:C ratio. The cost items were grouped into two categories, *i.e.*, i) non-recurring costs and ii) recurring costs. Total non-recurring cost includes cost on hives, bee hives, honey extractor, bee keeping kit and other miscellaneous items. The total recurring included, migration charges, labour cost, empty hive cost, other miscellaneous costs including depreciation as well as interest on non-recurring cost (Dhaliwal *et al.*, 2015). Benefits from apiary units were due to sale of honey, and additional hives.

## OBSERVATIONS AND ANALYSIS

The background information of the respondents was collected to determine the extent of their role and contribution in starting and continuing the enterprise of beekeeping. The socio-personal profile of the sample groups is shown in Table 1.

### Socio-personal profile of beekeepers :

The data given in Table 1 showed socio-personal profile of the respondents with respect to age, occupation, level of education, caste, land holdings etc. The details have been discussed as below.

The findings show that under majority (60.00%) of the respondents were falling in age group of 31-40 years. As far as occupational status is concerned, majority (62.2%) were unemployed rural youth in case of

**Table 1 : Socio-personal characteristic of the respondents ( n = 45)**

Personal characteristics			
Parameters	Variables	Frequency	Percentage
Age	20 - 30	12	26.7
	31-40	27	60.0
	41-60	5	11.1
	>60	1	2.2
Occupational status	Agriculture	15	33.3
	Other occupation	2	4.4
	Unemployed youth	28	62.2
Level of education	No formal education	2	4.4
	Middle	9	20.0
	Matriculation	21	46.7
	Senior Secondary	12	26.7
	Graduation	1	2.2
Caste	SC	6	13.3
	BC	4	8.9
	General	35	77.8
Land holding	Landless	7	15.6
	Marginal (<1.0 ha)	11	24.4
	Small (1.0-2.0 ha)	24	53.3
	Medium (2.0-10.0 ha)	3	6.7
	Large (>10.0ha)	0	0.0

migratory apiary units. This showed that beekeeping enterprise can be successfully promoted in rural areas door creating self employment among rural youth and also practising farmers. These results are in line of the findings of Moniruzzaman and Rahman (2009). It is evident that majority (46.7 %) of the respondents were having education qualification upto matriculation while about one fourth (26.7%) were having education upto senior secondary. Lal *et al.* (2012) also reported similar results. Mujuni *et al.* (2012) revealed that beekeepers participated in study had attained formal education, with the highest percentage (42.5%) having attained secondary education. A large majority (77.8 %) of the respondents were from general category while small proportion (13.3%) was belonging to schedule caste category. Finding further reveals that one half of the respondents were small farmers (53.3 %) and about one fourth was marginal category farmer (24.4 %). This indicated that economic status of small farmers can be improved by motivating to adopt beekeeping enterprise as main profession or as subsidiary occupation with the agriculture.

### Economic analysis of migratory apiary units :

The study revealed that mainly three routes were followed by beekeepers of Sri Muktsar Sahib district of Punjab (Table 2). In first route colonies were kept most of the time in southwestern part of the state. In the months of February and March colonies get flows from eucalyptus. Shisham (*Dalbergia sissoo*) in south western districts of Punjab is very good honey source during April month. In May, beekeepers migrated their colonies to Rewari district in Haryana for Jandi (*Prosopis cineraria*). Later in June colonies were taken to Mathura area in U.P. for pollen from Bajra and continue there upto august. In September colonies were moved to Sri Ganaganagar area for beri (*Ziziphus*) and eucalyptus and kept there upto February. The colonies were kept in locations in the area where mustards are cultivated. During the severe cold in January, the colonies perform well on mustard even when they get very short foraging time between 1100 to 1500 hr. The average number of honey harvest in this route was nine and total honey harvested were 35 kg/colony. The migration cost was estimated to be Rs. 100/colony.

In second route, during April beekeepers kept their colonies in Sri Muktsar Sahib district of Punjab and get nectar flow from shisham tree (*Dalbergia sissoo*). In May, colonies were migrated to Jalandhar district of Punjab for sunflower. In June, beekeeper migrated to Hoshiarpur area for Khair (*Senegalia catechu*) and continued there upto end July. In September colonies were moved to Banihal area of Jammu and Kashmir where, Kadi Pata (*Murraya koenigi*), tulsi (*Ocimum tenuiflorum*) flower during this period and 1-2 round of honey extraction were completed. During October-November colonies were kept in Matili, Naurbhadra area of Rajasthan for flow from beri (*Ziziphus*). In December colonies were shifted to Kota area where mustard is cultivated in large area and during the severe cold the colonies perform well as they get more foraging time due to clear weather in this region. The honey bees collect pollen and nectar from mustard till end February. In March month flow from coriander starts and colonies were kept in Kota till end of March and then shifted to Muktsar district. The average number of honey harvested in this route were 10 and total honey harvested was 45 kg/colony. The migration cost was estimated to be Rs. 215/colony.

In third route colonies were migrated within Punjab

and during mustard season they were kept in neighboring districts of Rajasthan. In the months of February and March colonies were kept in Muktsar district which get flows from eucalypts. Shisham (*Dalbergia sissoo*) provided bee food in April month. In May, beekeepers migrated their colonies to Bathinda district on vegetables.

In July, honey bees get flow from cotton and vegetables and were kept there till end August. In September colonies were moved to Mansa district for Beri (*Ziziphus*) and kept there upto October. During November months colonies migrated to Faridkot district for toria and kept there till December. In January, the colonies were moved

**Table 2 : Average migration cost and average total honey harvests in different migration routes**

Month	Area	Honey crop	No. of honey harvesting	Honey (kg/hive)	Migration cost/box (Rs.)
<b>Group I</b>					
March- April	Muktsar, Abohar, Bathinda (Punjab)	Eucalyptus, Shisham ( <i>Dalbergia sissoo</i> )	3.5	13.5	-
May	Rewari (Haryana)	Jandi ( <i>Prosopis cineraria</i> )	1.5	3.00	60.50
June- September	Mathura (UP)	Bajra	-	-	30.50
October-November	Ganganagar (Raj.)	<i>Ziziphus</i> (Beri), Eucalyptus	1.00	4.00	60.50
December- February	Ganganagar, Hanumangarh (Rajasthan)	Mustard ( <i>Brassica</i> Sp.)	4.0	14.50	-
Total			10.0	35.00	150.50
<b>Group 2</b>					
April	Muktsar (Punjab)	Shisham ( <i>Dalbergia sissoo</i> )	2.50	8.50	-
May	Malsian, Jalandhar, Nicodar,	Sunflower ( <i>Helianthus annuus</i> )	-		30.50
June- July	Hoshiarpur	Khair ( <i>Senegalia catechu</i> )	1.50	5.00	30.00
August	Banihal (J&K)	Tulsi ( <i>Ocimum tenuiflorum</i> ), Kadi Pata ( <i>Murraya koenigi</i> ),	1.00	3.50	30.50
September-October	Matili, Norbhadur	Beri ( <i>Ziziphus</i> )	1.00	3.50	45.50
November- February	Kota (Raj.)	Mustard ( <i>Brassica</i> sp.)	3.50	19.00	78.50
March	Kota	Coriander ( <i>Coriandrum sativum</i> )	1.50	5.50	-
Total			11.0	45.00	215.00
<b>Group 3</b>					
March-April	Sri Muktsar Sahib (Punjab)	Shisham, Eucalyptus	3.00	11.50	-
May-June	Bathinda (Punjab)	Sunflower ( <i>Helianthus annuus</i> ), Berseem	-		20.00
July-August	Bathinda (Punjab)	Cotton, Vegetables (cucurbits)	-		-
September-October	Mansa (Punjab)	Beri ( <i>Ziziphus</i> )	1.50	4.00	19.50
November	Faridkot (Punjab)	Toria, Eucalyptus	-		30.50
December-February	Hanumangarh (Raj)	Mustard ( <i>Brassica</i> )	4.00	13.50	30.00
Total			8.50	29.00	100.00

**Table 3: Relative economics of honey production under different migratory cycles**

Parameters	Group I (n <sub>1</sub> = 15)	Group II (n <sub>2</sub> = 15)	Group III (n <sub>3</sub> = 15)
Cost on honey production hive <sup>-1</sup>	2542.6	3328.5	2406.4
Honey production hive <sup>-1</sup> (kg)	35	45	29
Sale price kg <sup>-1</sup>	135.6	139.4	140.6
Total income hive <sup>-1</sup> from sale of honey	4746	6573	4077.4
Additional income from new colonies, wax etc.	742.8	868.3	735.9
Net income hive <sup>-1</sup> from sale of honey	2203.4	2944.5	1671.0
Net income hive <sup>-1</sup>	2946.2	3812.8	2406.9
B:C ratio	2.15:1	2.23:1	2.00:1

to Hanumangarh area of Rajasthan where mustard is cultivated. The average number of honey harvest in this route were 8 and total honey harvested were 29 kg/colony. The migration cost was estimated to be Rs. 150/colony.

Earlier studies also revealed the importance of migratory routes in beekeeping enterprises. Ahmad (1992) and Shahid (1992) discussed about migratory beekeeping in Pakistan to maximize yields. Singh *et al.* (1998) also suggested certain migratory routes for honey production and colony multiplication in Bihar, India. Gatoria *et al.* (2001) gave a brief account of examples of some routes followed by beekeepers practising migratory beekeeping in different parts of the country, based on their study. Some other workers (Sihag, 1990; Goyal and Rana, 1992; Chand *et al.*, 1995 and Suryanarayana and Rao, 1998) also discussed migratory route followed by beekeepers in other part of the country and suggested that these routes should be explored to maximize the returns from this profession. From above discussion it implies that beekeepers should follow different migratory routes depending upon their knowledge about the area and available bee flora in particular area. It will help to maximize their profits through higher honey yield and increased number of colonies.

### Comparative economics of different migratory routes :

A comparative economic analysis of three different migration cycles followed by bee keepers of district Sri Muktsar Sahib of Punjab state was calculated and compared. The average variable cost was calculated as per Dhaliwal *et al.* (2015) with actual migration cost incurred by the bee keepers in different migrate routes. The results revealed that cost of honey production was Rs. 2946.2 box<sup>-1</sup> in Group I, Rs. 3812.8 in Group II and Rs. 2406.4 in Group III. The honey sale price varied negligibly from Rs. 135.6 to 140.6 for three different groups. The total honey harvest was maximum in Group II *i.e.* 45 kg per box followed by Group I (35 kg/box) and Group III (29 kg/box). The net income from sale of honey and additional income from sale of new colonies and other bee products was also maximum (Rs. 3812.8) in Group II and minimum in Group III (Rs 2406.9. Benefit cost ratio was highest in Group II (2.23:1), followed by Group I (2.15:1) and 2.00:1 in Group III.

### Conclusion :

The comparative analysis of migratory units under different migration cycles revealed that migratory apiary units were established by the unemployed rural youth and small/marginal farmers. The comparative economics of bee keeping under different migration cycles followed by farmers showed that beekeepers were getting substantial returns, which was a good source of income especially for the rural people. It was found that farmers following different migration cycles have bearing on their economic returns. The economic investigation revealed that farmers migration to Kota area of Rajasthan were getting more economic returns than those migration to Gangananger and Hanumangarh area of Rajasthan. The study implies that beekeepers should follow different migratory routes depending upon their knowledge about the area and available bee flora in particular area.

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